

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
26 February 2004 (26.02.2004)

PCT

(10) International Publication Number  
**WO 2004/017040 A3**

(51) International Patent Classification<sup>7</sup>: **G01N 24/00**,  
33/00, 30/02, 33/566

GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin  
(CH).

(21) International Application Number:  
PCT/US2003/025367

(74) Agents: **MAHONEY, Jacqueline, F. et al.**; Perkins Coie  
LLP, P.O. Box 2168, Menlo Park, CA 94026 (US).

(22) International Filing Date: 13 August 2003 (13.08.2003)

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/403,909 16 August 2002 (16.08.2002) US  
0221469.0 16 September 2002 (16.09.2002) GB

(71) Applicant (*for all designated States except US*): **GENE-PROT, INC.** [US/US]; 1031 U.S. Highway 22, Suite #302, Bridgewater, NJ 08807 (US).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **BAUSSANT, Thierry** [FR/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **BOEHM, Guenter** [DE/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **HELLER, Manfred** [CH/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **KUSSMANN, Martin** [DE/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **MENIN, Laure** [FR/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **ROGERS, John** [FR/CH]; GeneProt, Inc., 2, Pré-de-la Fontaine, CH-1217 Meyrin (CH). **ROSE, Keith** [GB/CH];

Published:

— with international search report

(88) Date of publication of the international search report:  
21 October 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: MULTI-DIMENSIONAL CHROMATOGRAPHY SYSTEM FOR PROTEOMICS

(57) Abstract: The present invention relates to multidimensional chromatography systems for proteomics and methods for identifying lower-abundance proteins in body fluids. Abundant proteins(s) is first removed by affinity chromatography utilizing affinity chromatographic column functionalized with ligand capable of selectively binding the abundant protein in the sample. Multidimensional chromatographic techniques are applied to the eluent with a reduced content of the abundant protein followed by mass spectrometric analysis.



WO 2004/017040 A3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25367

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01N 24/00, 33/00, 30/02, 33/566

US CL : 436/173, 86, 161, 501

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 436/173, 86, 161, 501

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ARNAUD et al. "Purification of proteins by subtraction affinity chromatography", Protides of the Biological Fluids, 1979, volume date 1978, v. 26, pp. 649-52, Abstract	1-16
Y	ZHANG et al. "Multiple Separations Facilitate Identification of Protein Variants by Mass Spectrometry", Proteomics 2001, v. 1, pp. 1001-1009, the whole document	1-16
Y	"MULTIDIMENSIONAL CHROMATOGRAPHY": <a href="http://www.chem.agilent.com/cag/prod/lc/Application-multi.pdf">http://www.chem.agilent.com/cag/prod/lc/Application-multi.pdf</a> , 18 July 2002 (18.07.2002)	1-16
Y	WOLTERS et al. "An Automated Multidimensional Protein Identification Technology for Shotgun Proteomics", Anal. Chem., 2001, v. 73, pp. 5683-5690, the whole document	1-16
Y	REGNIER et al. "Multidimensional Chromatography and the Signature Peptide Approach to Proteomics", LCGC, February 2001, vol. 19, No. 2, pages 200-213; <a href="http://www.chromatographyonline.com">www.chromatographyonline.com</a> ; the whole document	1-16
X,P	ADKINS et al. "Toward a Human Blood Serum Proteome", Mol. Cell. Proteomics, 1.12, <a href="http://www.mcponline.org">http://www.mcponline.org</a> , 13 November 2002 (11.13.2002), the whole text	1-16
X,P	FERGUSON et al. "Proteome Analysis by MAss Spectrometry", Annu. Rev. Biophys. Struct., 24 January 2003, 32, pp. 399-424	1-16

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 11 March 2004 (11.03.2004)	Date of mailing of the international search report <b>29 MAR 2004</b>
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Yelena G. Gakh, Ph.D. Telephone No. (571) 272-1700 Jean Frechter Paralegal S

**INTERNATIONAL SEARCH REPORT**

PCT/US03/25367

**Continuation of B. FIELDS SEARCHED Item 3:**

STN Medline EAST Google

isolation, purification, separation, proteins, polypeptides, peptides, "affinity chromatography", immunoaffinity, "size exclusion", proteomics, abundance